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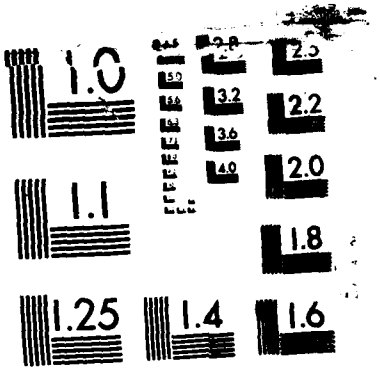
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MICROCOPY RESOLUTION TEST CHART

Report N00014-85-C-0856-0001AC

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AD-A168 289

ARCTIC COMMUNICATIONS TECHNIQUES: REMOTE UNATTENDED POWER SYSTEMS

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Technical Progress Report for period 16 December 1985 - 1 February 1986

Prepared for

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INTRODUCTION

The purpose of this report is to describe the accomplishments during the reporting period, 16 December 1985 through 1 February 1986, on the project entitled "Arctic Communications Techniques: Remote Unattended Power Systems".

ACCOMPLISHMENTS

Previous Reporting Period

As a recap, during the last reporting period, 2 November 1985 through 15 December 1985, the following progress was reported:

1. Completed 60 percent of the component parts for the first 60 cm^3 Ross-Stirling engine.
2. Incorporated drawing changes as a result of problems encountered in manufacturing of the detail parts.
3. Fabricated several parts for the second Ross-Stirling engine in areas that were considered of little risk and/or requiring outside services (ie. brazing, anodizing, honing, etc.).
4. Ordered several purchased parts.
5. Continued the preliminary engineering design and/or drafting of all other aspects of the program.

Current Reporting Period

All of the fabricated component parts for the first Ross-Stirling engine were completed. During the assembly process several interferences between some of the parts in the rotating mechanism were discovered causing drawing changes and subsequent rework to a few of the components. Assembly of the first engine was then completed. On the first attempt the engine ran successfully at approximately 3500 RPM.

The following anomalies were resolved during initial testing:

1. Water flow through the cooling jackets was insufficient. Cylinder block temperatures rose as high as 173° F (79° C). The water pump was replaced with a means to supply greater coolant flow and the cylinder block temperature was reduced to a satisfactory level of 122° F (50° C). The water jacket was also re-designed to allow for a greater surface area and the second engine will incorporate this change.

2. Several tests were run to determine the optimum surface area of the regenerator material. It was found that 21 feet (6.4 m) of the 1 in. (2.54 cm) by .001 in. (.00254 cm) 303 stainless steel strip was the most efficient length to provide maximum free engine speed of approximately 4000 RPM.

The fabricated component parts for the second Ross-Stirling engine are approximately 10 percent complete. Preliminary design of the control/monitoring electronics was initiated. All other aspects of the program continue in the design stage.

CONCLUSION

The successful "firing" of the first Ross-Stirling engine with relatively few problems was the first major milestone for the program. It is anticipated that progress will continue at a high level and that the results presented in the Final Report will prove the validity of the Phase I proposal, and further, will warrant a Phase II award.

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